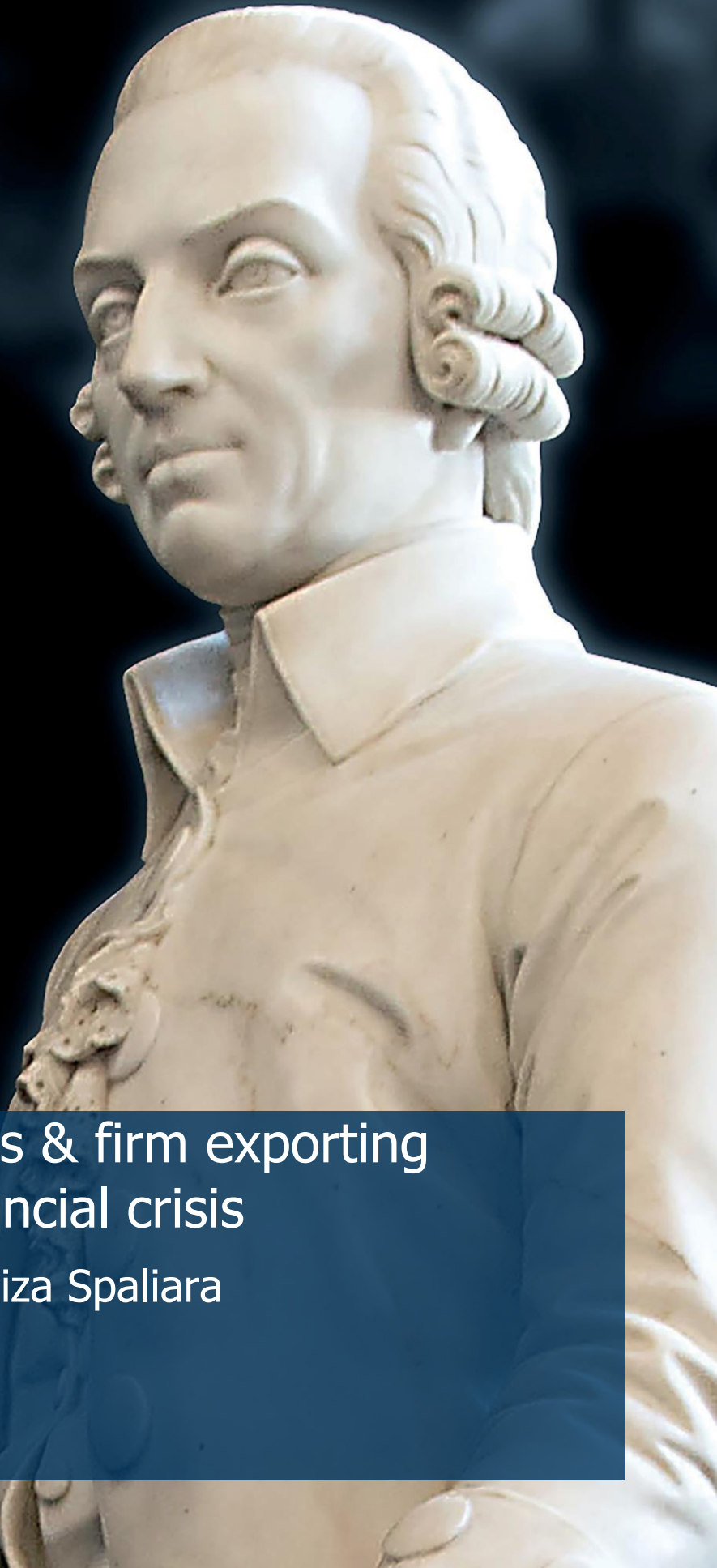




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WORKING PAPER SERIES



Private equity buyouts & firm exporting
during the global financial crisis

Paul Lavery and Marian-Eliza Spaliara

Paper no. 2022-09
August 2022

Private equity buyouts & firm exporting during the global financial crisis *

Paul Lavery[†] Marina-Eliza Spaliara[‡]

August 24, 2022

Abstract

This paper examines the impact of the global financial crisis on the firm-level exporting of private equity-backed companies. With a sample of over 600 UK companies which were under private equity ownership during the financial crisis, we show that the exporting of sponsored firms was significantly more resilient to the effects of the crisis, relative to a matched sample of control firms. Moreover, private equity-backed companies were also less likely to exit the export market during the crisis. We provide evidence that more efficient working capital and cash flow management may have helped sponsored companies maintain their levels of exporting relative to similar, non sponsored firms. Our results align with recent evidence that private equity-backed companies may outperform non sponsored peers during economic downturns.

Keywords: Private equity buyouts; exporting; financial crisis

JEL Classification: F14, G01, G32, G34

*We thank for their helpful comments Nick Wilson, Serafeim Tsoukas, and participants at the 2021 ETSG Annual Conference.

[†]Adam Smith Business School, University of Glasgow. E-mail: paul.lavery@glasgow.ac.uk

[‡]Adam Smith Business School, University of Glasgow. E-mail: marina.spaliara.gla.ac.uk

1 Introduction

The recent global financial crisis (GFC) had a profound impact on international trade flows. The OECD historical monthly data on its members' international trade reveal that the seven largest month-on-month decreases all occurred between November 2008 and November 2009. Imports and exports plummeted for the EU27 and ten other nations that together accounted for 75% of world trade; each of these trade flows dropped by more than 20% from 2008Q2 to 2009Q2¹ (Baldwin (2009)). A body of empirical research has investigated the main factors that affected trade during the GFC, highlighting the detrimental effect of credit tightening on exporting (Amiti and Weinstein (2011), Chor and Manova (2012), Bricongne et al. (2012), Görg and Spaliara (2018)). Given that there are substantial sunk costs for entering export markets and other costs associated with overseas operations, exports are highly dependent on access to finance. Therefore, the lack of funding during the GFC negatively affected the intensive and extensive margin of exporting. Despite the importance of external finance for the smooth operation of exporters in international markets, there is scant evidence on the relationship between private equity (PE) investment and exporting (Wilson et al. (2021), Lavery et al. (2021)). What is more, the potential role of PE firms in the exporting activity of targets during economics downturns has been overlooked. An interesting question that remains unanswered is whether PE owned exporters were more likely to receive financial and strategic support to weather the crisis. In other words, given the shortage of credit, were PE investors able to provide a "spare tyre" for exporting portfolio firms to dampen the effects of the crisis?

Overall, the literature on PE buyouts documents increases in operating performance, innovation and employment in PE portfolio companies (for example, Kaplan (1989), Boucly et al. (2011), Lerner et al. (2011), Fracassi et al. (2020), Lerner et al. (2019)). Acknowledging the importance of strategic advice, experience of overseas markets, and financial support

¹The ten other nations are Canada, China, India, Japan, Korea, Mexico, Russia, Switzerland, Taiwan and the US.

provided by PE investors to targets, [Lavery et al. \(2021\)](#) explore the impact of PE investment on targets' internationalisation. With a focus on the UK economy, they study around 1,400 buyouts from 2004 to 2017 to assess the mechanism through which PE investors affect targets' extensive and intensive margins of export. Specifically, [Lavery et al. \(2021\)](#) find that PE-backed companies are significantly more likely to enter the export market relative to a sample of matched, control firms, and that the value and intensity of their exporting increases as a result of PE ownership, compared to other non sponsored firms. Improvements in the exporting status of targets are achieved through the financing constraints and productivity channels. In close relation to this paper, [Wilson et al. \(2021\)](#) find that the superior performance of PE-backed firms in the export market is mainly driven by improved efficiency and relational capital via board representation to their acquisitions.

Yet, there exists a heated debate amongst researchers and policymakers concerning the role of PE firms in exacerbating or alleviating the real effects of economic downturns on the economy. On the one hand, portfolio company performance and deal returns of buyouts which take place during booms tend to be poorer ([Axelson et al. \(2013\)](#), [Lerner et al. \(2019\)](#)). Regulators argue that due to excessive amounts of leverage and the poor selection and structuring of transactions, PE investors may aggravate the effects of economic crises. Short-sighted investors looking for a quick return would leave companies at an increased risk of default during downturns ([ITUC \(2007\)](#), [Rasmussen \(2008\)](#)). On the other hand, PE investors may be able to help their portfolio companies stave off the effects of economic crises. Recent evidence show that PE-backed companies' investment and access to external financing was less-affected relative to their peers during the global financial crisis ([Bernstein et al. \(2019\)](#)). Similarly, their financial sponsors may be able to support them with additional operational and financial resources in times of need, and PE investors can often make use of their network with banks ([Ivashina and Kovner \(2011\)](#)). [Wilson et al. \(2012\)](#) show significant outperformance of PE-backed companies during the recession. They find significant, positive differentials in productivity and profitability for sponsored companies relative

to matched peers. Focusing on the financial sector, [Johnston-Ross et al. \(2021\)](#) compare US banks that were acquired by PE investors and banks that were acquired by other banks during the financial crisis. They find that PE-backed banks are less likely to go bankrupt and perform better during the crisis period. Finally, studying nearly 5,000 global buyouts, [Thomas \(2010\)](#) finds that PE-backed companies defaulted at less than one-half the rate of comparable companies during the global financial crisis (2.84% versus 6.17%), rebuffing critics' claims that overleveraged portfolio companies will be more vulnerable to default during downturns. In a similar vein, [Wilson and Wright \(2013\)](#) and [Hotchkiss et al. \(2021\)](#) show that PE-backed companies are less likely to enter bankruptcy compared to other companies, and when they do, they emerge faster from it.

In light of the abrupt crash in international trade flows during the financial crisis, and the recent evidence that PE-backed companies may have weathered the downturn better than other companies, we study the exporting behaviour of PE-backed and matched control firms over the course of the GFC. As the fall in credit supply accelerated the pressure on the operations of exporting firms, the additional debt financing and equity injections received by PE investors is expected to support firms' overseas activities. We examine whether PE-backed exporters are more likely to expand and increase their exporting activity during the financial crisis relative to their peers and whether their superior access to financing and active strategic support helps them to reduce the hazard of exiting the export market. Moreover, we uncover a new channel through which PE-backed companies may have been able to overcome the effects of the crisis and outperform their peers: better working capital management and a lower cash conversion cycle ². A firm's working capital and cash flow management can be used to assess the effectiveness of the firm's management and its need for external financing ([Wang \(2019\)](#)), and consequently, can have implications for their performance during economic downturns. As exporters are likely to have higher working

²The cash conversion cycle (CCC) refers to the time elapsed from the moment the firm pays for its inputs to the moment it receives payment for the goods it sells. It is a widely used metric to assess the effectiveness of a firm's management and the liquidity needed for external financing.

capital needs given that they may have to cover costs associated with goods that have been produced but not yet delivered (Amiti and Weinstein (2011)), an efficient cash management and working capital cycle is a critical part of their overseas survival .

Our empirical analysis involves a sample of over 600 UK-based PE-backed companies which were under PE ownership during the financial crisis. In order to determine whether PE-backed companies' exporting was more resilient to the crisis than non sponsored peers, we use a difference-in-differences approach, whereby we match PE-backed companies to control firms which are similar across several firm-level characteristics in the pre-crisis period, such as industry, size, profitability, and leverage. The choice of the UK as a setting for the study is driven by three key benefits. Firstly, UK law requires all limited companies in the UK to provide certain accounting information to the public UK register. Given that our analysis typically involves mid-market companies, we have excellent coverage of balance sheet and income statement information in our sample. Second, the UK is the largest and most active private equity market in Europe, with the highest average annual deal value, and aggregate annual deal value relative to GDP in Europe (Bernstein et al. (2019)). Finally, prior to the crisis, the UK played an important role in international export markets. In 2007, it was the second largest exporter of commercial services, accounting for over 8% of the market, and the eighth largest exporter of merchandise trade, with over 3% of the global market share (WTO (2008)). In total, the UK accounted for over 4.5% of global exports making it the fifth largest global exporter³.

Our primary findings are threefold. We find that PE-backed companies' exporting was significantly more resilient to the effects of the global crisis than that of similar, matched peers. We document positive differentials across firms' export growth, value of exports, and exporting intensity (as measured by the ratio of export sales to total firm sales) during the crisis, relative to control firms. This is robust to controlling for various firm-level attributes and a range of fixed effects, as well as adjustments to our sample selection and to our matching

³This is according to data from the World Integrated Trade Solutions (WITS) database of the World Bank

technique. We then go onto show that PE-backed firms exhibited a lower hazard of exiting the export market during the crisis. Previous research has shown that the export market exit rate of firms increased during the crisis, and in particular for firms which were in a poorer financial condition (Görg and Spaliara (2018)). We show that the ownership structure of firms also matters, by providing evidence that PE-backed companies were less likely to stop exporting altogether during the crisis. Finally, we aim to shed light on why PE-backed firms may have been able to outperform their peers' exporting during the crisis. While recent work has shown that PE-backed firms may have better access to credit markets during crises (Bernstein et al. (2019)), and can call upon their investor's links with banks (Ivashina and Kovner (2011)), we uncover another channel which can help to explain their outperformance. We show that the working capital and cash flow management of sponsored firms was significantly stronger and more efficient during the crisis. Specifically, our results show that PE-backed firms which had less efficient working capital and cash flow management prior to the crisis are more likely to improve their exporting during the crisis compared to their counterparts. This aligns with the view that PE investors induce operating improvements in target firms which help enhance their exporting capabilities.

This paper is related to studies which have examined the effect of PE ownership on firms' resilience to economic downturns (Thomas (2010), Wilson et al. (2012), Bernstein et al. (2019)). Moreover, we relate to a wider branch of work which studies the effects of PE buyouts on firm performance and outcomes (Kaplan (1989), Boucly et al. (2011), Fracassi et al. (2020), Lerner et al. (2019), in particular with regards to firm-level activity in international export markets Lavery et al. (2021), Wilson et al. (2021)). Finally, we relate to a body of work in the international trade literature which examines firm exporting and participation in export markets during economic crises (Amiti and Weinstein (2011), Bricongne et al. (2012), Chor and Manova (2012), Görg and Spaliara (2018)).

The remainder of the paper is structured as follows: section 2 outlines our hypotheses. Section 3 describes the data used, while sections 4 to 7 outline the empirical models used

and discuss the findings. Section 8 concludes.

2 Hypothesis development

The decline in international trade as a result of the financial crisis is well documented. The global average annual export growth reported by the World Trade Organisation was over 5% in 2007, around 2% in 2008, and then fell to -12% in 2009 after the crisis took effect and spread across countries ([WTO \(2012\)](#)). The UK's export volume index fell by more than 10% over the same period and UK exports of goods and services fell by 8.4% according to ONS data, respectively. A number of papers analyze the effects of credit disruptions on trade during the Great Trade Collapse of 2008. [Bricongne et al. \(2012\)](#) find that smaller and financially dependent exporters reduced the range of destinations served or stopped exporting altogether. [Paravisini et al. \(2015\)](#) follow the literature on the real effects of the bank lending channel and documents that credit shocks reduce exports.

The role of PE investors in portfolio firm performance during financial crises has recently been explored by scholars ([Thomas \(2010\)](#), [Wilson et al. \(2012\)](#), [Bernstein et al. \(2019\)](#), [Johnston-Ross et al. \(2021\)](#)). Given the capital injection and operational improvements associated with private equity buyouts, there is a breadth of evidence implying that private equity investors are able to ease the financial constraints facing their portfolio companies and to improve their post buyout performance ([Boucly et al. \(2011\)](#), [Amess et al. \(2016\)](#), [Fracassi et al. \(2020\)](#)). Specific to firms' exporting, [Lavery et al. \(2021\)](#) find that increases to firms' exporting relative to a sample of matched control firms is higher in target firms which were ex-ante more likely to be financially constrained and less productive prior to being acquired by a PE investor. Similar conclusions are reached by [Wilson et al. \(2021\)](#) who suggest that the better performance of PE-backed firms in the export market is mainly driven by the improved efficiency and relational capital via managerial change and board representation.

The tightening in the credit supply and bank lending in particular caused the deterioration in firms' financial health, consequently affecting firms' performance. The trade literature indicates the eminent role of credit supply for the successful operations of firms in overseas markets. PE investors can inject additional debt and equity into firms, help to ensure efficient firm governance, and provide active, strategic support when their portfolio firms need it most. Taking these considerations into account, we expect that given the shortage of credit and its crucial role in firms' international engagement, PE investors are able to provide a "spare tyre" for exporting portfolio firms to dampen the effects of the crisis.

Hypothesis 1: *Private-equity backed companies exporting' is more resilient during the financial crisis relative to the exporting of non sponsored firms*

The financial health and condition of firms has been shown to be important in determining their ability to participate in international export markets given the associated fixed costs (RD, advertising, capital equipment) and variable costs (rental fees, intermediate input purchases) of entering into foreign markets (Bernard and Jensen (2004); Greenaway et al. (2007); Muûls (2015)). As access to finance can be the driving force for firms wishing to expand their sales beyond domestic markets, credit scarcity during economic downturns could be detrimental for their entrance into and survival in export markets. In this respect, Görg and Spaliara (2014) consider how firms responded during the GFC with respect to export market participation decisions. They find that firms' financial soundness is highly important in predicting export market entry, especially in the midst of the global financial crisis. In terms of firms' ability to remain exporters during economic downturns, Görg and Spaliara (2018) show that credit constrained firms and those operating in financially vulnerable industries were more likely to exit the export market during the GFC and to remain out of the export market even after the crisis ended. Given the abundance of literature pointing toward improvements in productivity, distress risk, and the operating performance of PE-backed firms (Thomas (2010), Boucly et al. (2011), Fracassi et al. (2020), Lerner et al.

(2019)), we stipulate that PE-backed firms are more likely to experience a higher (lower) probability of export market entry (exit) during the financial crisis.

Hypothesis 2a: *Private-equity backed companies face a higher likelihood to enter the export market during the financial crisis relative to the non sponsored firms*

Hypothesis 2b: *Private-equity backed companies' hazard of export market exit is lower during the financial crisis compared to non sponsored firms*

A potential channel through which PE-backed firms could outperform their peers during crises is a more efficient working capital and cash flow cycle. Since buyouts tend to involve a substantial amount of debt being added into companies, efficient cash control and working capital management are vital for target firms. As far as trade is concerned, an increase in exports leads to higher working capital needs as firms may need to cover the costs of goods that have been produced but not yet delivered. This reflects that completing an international transaction typically involves a long time lag, due to the high number of days involved in the transit and custom procedures (Amiti and Weinstein (2011)). The consequent strain on working capital and the higher working capital needs implied by exports translate into stronger funding requirements. These are often provided by banks through letters of credit. PE-backed firms are expected to receive the necessary support from their PE sponsor to overcome the financial burden. As the growth in exports is expected to lead to an increase in the volume of trade receivables, effective management of firms' working capital is essential. Wilson et al. (2012) and Weir et al. (2015) show that post-buyout targets enhance the efficiency of working capital management, improve financial control by reducing debtor days (Wright et al. (1992)) and achieve faster payments by customers Boucly et al. (2011).

Along similar lines, the cash conversion cycle is another important determinant of firms' management and successful overseas trading. Poor cash control indicates that a firm must wait longer to receive cash for its sales, and is therefore more reliant on short term debt. As such, a firm's control of its cash flow and working capital cycle can reflect the effectiveness

of a firm’s management and its liquidity need for external financing (Raddatz (2006), Wang (2019)). Linking to firm performance during the crisis, those with poorer cash control are more likely to have a greater need to finance working capital and are therefore more reliant on short term debt to do so. Subsequently, their exposure to aggregate funding risk is higher (Tong and Wei (2011); He and Xiong (2012)) and their reliance on short-term debt increases the likelihood to under-perform during the financial crisis (Duchin et al. (2010)). Given that PE-backed firms receive operational and management guidance, have superior access to finance during crises (Bernstein et al. (2019)) and PE investors have strong ties with the banking industry (Ivashina and Kovner (2011)), improvements in the efficiency of portfolio firms’ cash flow and working capital are expected to be more pronounced for PE sponsored exporters.

Hypothesis 3: *PE investors help improve target firms’ cash flow and working capital management which helps them to maintain their levels of exporting and to remain in the export market during the crisis*

3 Data & Descriptive Statistics

3.1 Data sample

In order to construct the data set, we rely on two primary data sources. Firstly, we use S&P Capital IQ to identify all private equity transactions where the target firm is located within the UK. Capital IQ is the primary source of private equity transactions used in recent academic studies⁴. We consider deals which are shown as being ‘completed’ and we omit deals which are announced but not yet completed. We take all relevant transaction information, such as the completion date, the name of the private equity investor and the size of the transaction.

⁴It is used as a source of private equity buyout transactions in, among others, Strömberg (2008), Fang et al. (2013), Jenkinson and Sousa (2015), Bernstein and Sheen (2016), Faccio and Hsu (2017), Fracassi et al. (2020), Bernstein et al. (2019), Lavery et al. (2021)

Our selection strategy of buyout transactions follows that of [Bernstein et al. \(2019\)](#), who likewise study firm performance during the global financial crisis. That is, we select all deals involving a UK-based target firm which take place before the end of 2007, and where the private equity investor has not exited before the end of 2008. In order to identify how and when the private equity investor has exited a deal in each case, we make use of a variety of resources. We use Capital IQ’s merger & acquisition database to search for sales to trade buyers and sales to other private equity investors (secondary buyouts). We also use Nexis and manual searches through financial news to search for acquisitions, initial public offerings and bankruptcies/liquidations involving target firms. In some cases, we have to conduct extensive web searches on a deal-by-deal basis to deduce the ultimate outcome of the transaction.

The second part of the sample construction involves matching private equity buyout targets from Capital IQ to the FAME database, which is used to source companies’ financial accounts. FAME is a Bureau van Dijk database which sources historical accounts of companies located in the UK from Companies House, the national UK registrar. It provides information on firms’ balance sheets, profit & loss accounts and other information such as the location of firms, industry codes and their date of incorporation. In order to maximize the matching between Capital IQ and FAME, we match buyout targets manually to the FAME database. This leaves us with an initial sample of 620 private equity buyout targets. [Table 1](#) describes the sample of buyouts in the study. Panel A shows the time series distribution of the deals in the run up to the financial crisis. Panels B and C detail the type of buyouts and the exit status of the transactions. Consistent with other studies, the majority of deals are private-to-private buyouts, while most deals are exited via sales to trade acquirers or to other private equity investors (secondary buyouts). Finally, the mean (median) size of transaction is £260 million (£48 million).

3.2 Constructing a matched control group

Crucial to implementing a successful difference-in-differences approach is building a suitable sample of control firms. That is, a sample of firms which are similar to the sample of private equity-backed firms in the pre-crisis period, but *did not* receive private equity investment. Our matching technique is similar to recent work by [Boucly et al. \(2011\)](#), [Bernstein et al. \(2019\)](#), and [Lavery et al. \(2021\)](#) and involves matching private equity-backed firms to control firms based on the two groups of firms having similar characteristics in the pre-crisis year (2007). Accordingly, and consistent with recent literature, we match control firms to private equity-backed firms based on the industry in which they operate, and on their size, profitability and leverage in 2007 - the year before the onset of the crisis. As such, we select up to 5 companies for each portfolio company which: 1) operate in the same 2-digit SIC code; 2) have total assets within 50% of the private equity-backed firm in 2007; 3) have a return on assets within a 50% bracket of the target company, and 4) have leverage (total debt/assets) within 50% of the target in 2007. Using this method, we are able to match 417 private equity-backed firms to adequate control firms. This represents a matching success of 67%.

In order to ensure our matching technique is adequate for a difference-in-differences model, we show some summary statistics of key variables in 2007 for both the treated and control samples in table 2. The two groups of firms are very similar across all variables in 2007, prior to the crisis. As expected, profitability and leverage are almost identical given that they formed part of the matching process, as is firms' cash flow. Size, as measured by total assets and firm sales, are not significantly different between the two groups. We also explore how firms' exporting differs in the pre-crisis period. Control firms have a slightly higher value of exports and export intensity in the pre-crisis period. Of greater importance, however, the one- and two-year growth rate in exports in 2007 are not statistically significantly different between each group.

As we use a difference-in-differences approach in our empirical analysis, in table 3, we go

a step further and examine the three-year growth rates of all observables in the pre crisis period. The difference in growth rates between the treated and control samples are not statistically significant zero for all variables, suggesting that the two groups of firms followed similar trends in the run up to the crisis across all observable variables. We then graphically show the evolution of firms’ exporting around the financial crisis in figure 1, by looking at the median one-year growth rate of export value for PE-backed and matched control firms. Figure 1 offers the first insight into the potential cushioning impact private equity sponsorship may be able provide to firm’s exporting in the midst of a financial crisis. A comparison of the pre-crisis export growth trend in buyout targets and control firms reveals no obvious differences, suggesting that the parallel trends assumption required for difference-in-differences estimation is largely satisfied. Once the crisis hits, the median export growth of control firms drops considerably, from around 12% to 1%, while that of private equity-backed targets remains relatively stable in comparison. Together, the summary statistics and growth rates in tables 2 and 3 and the graphical evolution of firms’ exporting in figure 1 imply that PE-backed firms were similar to the matched control group of firms in the pre crisis period.

4 Exporting during the crisis

4.1 Econometric model

In a formal examination of the effect of private equity ownership on firm exporting around the crisis, we adopt a difference-in-differences model where we estimate the following baseline equation:

$$y_{it} = \alpha_t + \alpha_i + \beta(PE_i * Post_t) + \theta X_{it} + \varepsilon_{it} \quad (4.1)$$

Where the dependent variable is the natural logarithm of export value, and the exporting

intensity, which is the ratio of a firm’s export sales to total sales. PE takes the value one for all private equity-backed companies and zero for controls. $Post$ is equal to one after 2007 and zero before. We include firm and year fixed effects, denoted by α_i and α_t . θ represents a covariate of firm-level controls and includes the logarithm of firm sales, leverage (the ratio of total debt to total assets), cash flow (earnings plus depreciation, scaled by total assets), and profitability (net income divided by total assets). These control variables are taken in the pre-deal year (2007) and are interacted with the $Post_t$ variable. Standard errors are clustered at the firm-level.

To further validate the parallel trends assumption, we extend the analysis to gain an insight into how firm’s export growth evolves over time around the crisis. Figure 1 shows that the divergence in treated and control firms’ exporting appears to have coincided with the onset of the financial crisis in 2008. We formally explore how firms’ exporting evolves over time around the crisis in more detail by estimating the following equation, which shows year-by-year effects of private equity ownership:

$$y_{it} = \alpha_t + \alpha_i + \sum \beta_k(PE_i) + \theta X_{it} + \varepsilon_{it} \quad (4.2)$$

Where we estimate a different β_k for each year between 2004 and 2011, using the pre-crisis year, 2007, as the reference year. In line with our hypothesis, we expect the effect of private equity ownership on firms’ exporting to appear only at the onset of the crisis.

4.2 Empirical results

The regression results of Equation 4.1 are displayed in Table 4. In columns 1 and 2, we find that buyout target companies’ export value fell by less than non-private equity-backed companies during the financial crisis. The effect of private equity ownership on exporting is both statistically significant and large in economic magnitude. Target companies’ export value increased by around 25% relative to control firms during the crisis. This is consistent

with the graphical representation in Figure 1. The inclusion of firm-level control variables in columns 2 has no impact on the coefficients. In columns 4 and 5, we turn our attention to firms' exporting intensity, measured by the ratio of export sales to total sales. Again, our results are clear. Private equity-backed firms increased their exporting intensity relative to that of similar, unsponsored firms during the financial crisis. Specifically, they show that firms under private equity ownership increased their export intensity by around 2% relative to control firms. Taken together, the findings in table 4 clearly show that PE-backed firms outperformed control firms during the financial crisis across both measures of exporting activity.

While estimates in table 4 capture the average change in exporting from the pre-crisis to post-crisis period, they do not indicate the timing of the relative increase in exporting of private equity-backed companies. Accordingly, to further verify our findings in table 4, we run equation 4.2, and present the results in 5. If β_k accurately captures the causal effect of private equity ownership on firms' exporting during the crisis period, we would expect to see an effect arise only at the onset of the financial crisis. The results in table 5 are consistent with this. When we look at the each of the export value and the exporting intensity, it is clear the increase in exporting of PE-backed firms relative to control firms appears at the onset of the global financial crisis. In the pre-crisis period, however, both groups of firms appear to follow similar trends. This echoes the divergence witnessed in figure 1, where, at the onset of the crisis, non sponsored firms' export sales growth drops dramatically relative to that of PE-backed firms. In each case, the impact of PE ownership appears at the onset of the financial crisis.

5 Robustness tests

Below we detail several robustness checks we performed to ensure the validity of our results. The results of each test are detailed in the online appendix.

5.1 Remove secondary buyouts

First we drop all secondary buyouts from our sample and rerun our baseline model. There is recent evidence that the rationale and motives for secondary buyouts may differ from that of primary buyouts (Wang (2012); Arcot et al. (2015); Degeorge et al. (2016)). To control for the potential that the inclusion of secondary buyouts may affect our results, we remove them from the sample and the main results hold. PE-backed firms' exporting continues to outperform that of control firms during the crisis period across all measures of export performance.

5.2 Remove management buyouts

Second, we drop management buyouts (MBOs) from the sample. An MBO involves the existing management team taking a stake in the company and therefore has increased incentives to improve its operating performance. As such, Bernstein et al. (2019) suggest that MBOs may have lower engagement from PE investors. To explore whether the inclusion of MBOs is driving our findings, we drop them from the sample and repeat the main analysis. As before, our main findings continue to remain intact.

5.3 Remove deals executed in 2007

To further validate our findings, we next drop all buyouts which took place in 2007, which reduces our sample by around one third. This alleviates any concern that some of our buyout transactions occurred too close to the beginning of the crisis period, as we define it, and that the ownership change and the impact of the private equity investor may not have taken full effect by the time of the crisis. This leaves us with a sample of PE-backed firms which were acquired by investors some time before the onset of the crisis. Despite the drop in sample size, the findings are upheld. In a yet further and more stringent check, in unreported regressions our results remain largely intact if we also drop deals which took place in 2006,

albeit this reduces our sample of buyouts by over 50%.

5.4 Attrition bias

Third, in order to account for any potential attrition bias from firms exiting via acquisition or liquidation, we narrow our sample to include only the years 2006 to 2009. This allows us to observe whether or not the change in firms' exporting behaviour occurred at the very onset of the financial crisis. We find similar regression results, underlining what we see in figure 1: the relative drop in non-PE-backed firms' exporting occurs very much in line with the financial crisis.

5.5 Alternative matching

Finally, we make adjustments to our matching technique which we used to match control firms to each PE-backed firm. Firstly, we tighten our matching bandwidths from 50% to 30%, and then also to 20%. In each case, while the number of matched target firms is reduced, our results remain intact. Second, we match companies in earlier years than 2007. When we match companies based on characteristics in 2005 or in 2006, our main findings continue to hold.

6 Export market exit during the financial crisis

Having established that PE-backed firms fared better during the financial crisis in terms of their exporting relative to non sponsored firms, we then ask whether the hazard of export market exit differed between PE-backed and non-PE-backed firms during the financial crisis. It has been shown by [Görg and Spaliara \(2018\)](#) that export market exit increased significantly for UK firms during the financial crisis, and in particular for firms which were in weaker financial condition. Building on this, we look to determine whether the ownership structure of firms mattered for their survival in the export market during the recent crisis.

In order to model whether or not private equity ownership matters for firms exiting the export market during the crisis, we first need to specify what we mean by an individual firm’s exit from the export market. We define a firm as exiting the export market in year t if it exported in years $t-1$ and $t-2$ but not in year t . Following [Görg and Spaliara \(2018\)](#), to ensure that we correctly identify firms which definitely exit the market and do not start exporting again during our sample period, export market re-entrants are not counted as exiters.

6.1 Hazard functions

In order to understand export market dynamics for treated and control firms, we first analyse firms’ exit from the export market during the financial crisis using a survival analysis framework, similar to that employed by [Jenkinson and Sousa \(2015\)](#). The hazard functions give the instantaneous probability of exiting the export market given that the firm is private equity-backed or not (the hazard rate).

$$(\lambda_t) = \lim_{dt \rightarrow 0} \frac{Pr(t \leq T < t + dt | T \geq t)}{dt} = \frac{f(t)}{S(t)} \quad (6.1)$$

Where:

$S(t) = Pr(T > t) = 1 - F(t)$ (the survivor function)

$F(t) = Pr(T \leq t)$ (the exit time distribution function)

$f(t) = dF(t)/dt$ (the density function of the exit time distribution)

The hazard functions for private equity-backed firms and control firms are shown in [Figure 2](#), and offer an initial insight into the export market exit dynamics of the two groups of firms. As expected, at the onset of the financial crisis in 2008, the probability of exiting the export market rises for both private equity-backed and control firms. However, the exit probability rises considerably more for control firms relative to sponsored firms, offering an initial indication as to the two samples of firms’ export market exit rate during the crisis.

It appears that non sponsored firms were more likely to exit the export market relative to private equity-backed firms, given the steep rise in the hazard function for these firms.

The survival analysis is then extended using a Cox proportional hazard model where the hazard rates depend on whether the firm is private equity-backed or not, and a set of control variables which are measured in the the pre-crisis year ⁵:

$$(\lambda) = \lambda_0(t) \cdot e^{(\beta_0 + \beta_1 PE_i + \beta_2 X_i)} \quad (6.2)$$

The vector of control variables, X , includes a host of firm-level control variables measured in the pre-crisis year which are taken from prior literature which have been found to impact export market participation in firms. Accordingly, we control for firm size (as measured by total assets), firm age, productivity (sales per employee), leverage (as measured by the ratio of total debt-to-total assets), cash flow (measured by earnings plus depreciation and is scaled by total assets) and profitability, which is the return on assets (net income divided by total assets). These firm-level variables have been suggested by prior research as being important determinants of firm participation in export markets ([Greenaway and Kneller \(2004\)](#), [Greenaway et al. \(2007\)](#), [Bellone et al. \(2010\)](#), [Görg and Spaliara \(2018\)](#)).

The estimation results are displayed in Table 6. Consistent with our initial hypothesis, the model shows that private equity-backed firms tended to have a lower export market exit rate compared to control firms. The significant, negative sign on the coefficient of the PE variable illustrates that PE sponsored firms had a lower hazard of exiting the export market relative to non sponsored firms during the crisis⁶. This parallels the patterns in Figure 2 , where we see a considerable divergence in the hazard functions of export market exit at the onset of the financial crisis. Finally, consistent with prior literature, firms size, age, and productivity are found to be important determinants of export market participation

⁵This is a semi-parametric model which does not make any assumptions about the form of the baseline hazard function, $\lambda_0(t)$, which does not have to be specified, making the model flexible and hence widely used

⁶Similarly, if we look at hazard ratios instead of regression coefficients, the hazard ratio on the PE variable is less than one, implying that PE ownership of firms is associated with a lower hazard of export market exit.

(Bernard and Jensen (1999), Greenaway and Kneller (2004), Greenaway et al. (2007), Lavery et al. (2021)).

6.2 Econometric model

While the Cox model is a semi-parametric model, we next set out a benchmark regression model to estimate how the probability of a firm exiting the export market during the financial crisis (its hazard of export market exit) is affected by whether or not the firm was private equity-backed:

$$h(j, PE) = 1 - \exp[-\exp(\beta_1(PE) + \beta_2Y + \gamma_j)] \quad (6.3)$$

The discrete-time hazard function $h(j, K)$ shows the interval hazard for the period between the beginning and the end of the j th year after the first appearance of the firm. As before, PE is a dummy variable taking the value one for private equity-backed firms, and zero for controls. The sign and significance of β_1 shows the importance of private equity ownership on the probability of firms exiting the export market during the financial crisis, relative to control firms. Y denotes a vector of control variables which, as before, includes firm size, age, productivity, profitability, leverage and cash flow. The model also includes a full set of time dummies to control for macroeconomic effects. γ_j is the log of the difference between the integrated baseline hazard evaluated at the end and the beginning of the interval, and captures duration dependence. As we are examining the likelihood of exiting the export market, an OLS estimation would be inappropriate. Accordingly, we use a complementary log-log model (cloglog), a discrete time version of the Cox proportional hazard model, following Görg and Spaliara (2018). We also use a probit estimator to verify the significance of our results.

6.3 Empirical results

The results of estimating Equation 6.3 are presented in Table 7. Columns 1 and 2 show the results of estimating a complimentary log-log model, while columns 3 and 4 are probit models. All columns include year fixed effects, while columns 2 and 4 also include a host of firm-level control variables. The results in table 7 are consistent with the semi-parametric Cox model. In each specification, the hazard of exiting the export market is significantly lower for PE-backed firms relative to control firms. Private equity ownership is found to exert a negative effect on the hazard of export market exit during the financial crisis. This is consistent with our expectations, as previous evidence suggests that firms with PE backing are more robust and resilient to downturns in the economic cycle (Thomas (2010), Wilson et al. (2012), Bernstein et al. (2019)). In columns 2 and 4 where we control for various firm characteristics, the statistical significance of our results remains intact, and there is a minimal effect on the economic magnitude of the findings. As before, the coefficients suggest that firm size and productivity are important in determining firm participation in export markets which is consistent with the consensus in the literature (Bernard and Jensen (1999), Greenaway and Kneller (2004), Greenaway et al. (2007)).

In summary, the results in this section imply that private equity ownership is important for firms' survival in export markets during periods of economic crisis. This is in line with our initial hypothesis, given that existing literature suggests that private equity investors can help firms to become more productive, more profitable and more recession-resistant (Boucly et al. (2011), Lerner et al. (2019), Bernstein et al. (2019)), and it is typically more productive firms and firms with a better financial health which tend to participate in export markets (Bernard and Jensen (2004), Görg and Spaliara (2018)).

7 Cash flow management during the crisis

Having firmly established that PE-backed firms' exporting was more resilient during the crisis, we finally explore *how* they may have been able to better sustain their export activity relative to non sponsored firms, by examining firms' cash flow and working capital management. While previous work has suggested that PE-backed firms may be better able to access finance during economic crises (Bernstein et al. (2019)) and that PE investors have strong ties with banks which can be of benefit to their portfolio companies (Ivashina and Kovner (2011)), we look to shed light on another channel through which sponsored firms may have been able to outperform their peers during financial crises. Specifically, we look to firms working capital and cash flow management. Given that exporters typically have higher working capital needs (Amiti and Weinstein (2011)), and given that a firm's working capital efficiency and cash flow control can proxy for the effectiveness of its management and its reliance on external finance (Raddatz (2006), Wang (2019))), this implies that exporting firms may require a more efficient working capital and cash flow management cycle, and tighter financial control. If PE investors can help firms to operate more efficiently from a working capital and cash flow perspective, this could help to explain the better exporting performance witnessed during the financial crisis. As the capital structure of PE buyouts typically involves a considerable amount of debt, portfolio companies' ability to service this debt is dependent upon efficient cash management and a well-oiled working capital cycle. Accordingly, we would typically expect PE-backed companies to have efficient working capital and cash management.

We consider two measures relating to the efficiency of firms' cash flow management and their stock of working capital. First, we look at the natural logarithm of firms' net working capital. As Amiti and Weinstein (2011) discuss, exporters are highly dependent on access to finance, much more so than domestic operations of firms. Consequently, exporting firms are likely to have greater working capital needs relative to non-exporters. We also scale net working capital by total sales, as is common in the literature (Aktas et al. (2015)). Second,

we consider firms' cash conversion cycle (CCC) which combines the cycles of inventories, accounts receivable, and accounts payable. In particular, it refers to the time elapsed from the moment the firm pays for its inputs to the moment it receives payment for the goods it sells. It is a widely used metric to assess the effectiveness of a firm's management and the liquidity needed for external financing (Raddatz (2006), Wang (2019)). A lower CCC implies a firm is better able to manage its working capital and is in a better liquidity position (Ding et al. (2013)). A higher CCC suggests that firms have to wait longer before they can receive cash from their sales and therefore have a higher need for external financing for their working capital, and are more reliant on short-term debt (Raddatz (2006), Tong and Wei (2011)). More generally, Ding et al. (2013) show that better working capital management can help firms mitigate the effects of financing constraints on fixed investment, and Aktas et al. (2015) provide evidence of how corporate investment is an important channel through which efficient working capital management translates into superior firm performance. Specific to firms' CCC, Zeidan and Shapir (2017) show that operational efficiency is the main mechanism by which minimizing the CCC drives value creation.

7.1 Empirical Results

In order to obtain a first glimpse of the potential effect of private equity sponsorship on firms' working capital management during the crisis, figure 3 provides a graphical interpretation of the evolution of firms' net working capital around the crisis. Specifically, the graph shows the α_t of the following equation:

$$(y_{it}) = \alpha_t + \alpha_i + \varepsilon_{it} \tag{7.1}$$

Where y_{it} is a firm's net working capital, α_t captures year fixed effects and α_i captures company fixed effects. The year precedent to the crisis, 2007, is used as the base period and its corresponding coefficient is normalized to zero. The equation is estimated separately

for both the private equity-backed and control samples, with standard errors clustered at the firm level. The graph suggests that both our treated and control samples follow similar paths in the run up to the crisis, after which PE-backed firms' stock of net working capital increases relative to that of control firms, offering an initial insight into the effect that private equity ownership may have on the working capital management of target firms during the crisis period.

In order to formally test whether PE-backed firms' working capital and cash management improved relative to control firms over the crisis period, we use regression equation 4.1, where our dependent variables are logarithm of the CCC number of days, the logarithm of firms' net working capital, and the ratio of net working capital to firm sales. The results are presented in table 8. In column 1, we find that PE-backed companies' CCC (measured in number of days) decreased relative to non-PE-backed firms around the financial crisis. The effect is statistically significant and meaningful in terms of its economic magnitude. Relative to controls, PE-backed firms saw their CCC fall by around 12 percentage points in the crisis period. In Column 2, we show that the results are unchanged in terms of both size and statistical significance when we add the standard set of firm-level controls from equation 4.1. Similar conclusions arise from columns 3 and 4 of table 7, where the dependent variable is the natural logarithm of net working capital (we add company controls in column 4). PE-backed firms' net working capital is found to increase by approximately 20 percentage points around the crisis, relative to control firms. Lastly, when we scale firms' net working capital by total sales, the statistical significance of the effect of PE ownership still appears to be important.

While the above shows that PE-backed firms had better cash flow management during the crisis relative to similar control firms, it does not explicitly study whether PE investors improve portfolio companies' exporting through improvements in their working capital and cash flow control. In order to do so, we split the sample into firms with better and weaker cash flow management prior to the crisis. If the effect of PE ownership is stronger on firms which had poorer cash flow management before the crisis, this would suggest that PE ownership

and exporting are positively related during the crisis, but even more so for firms which had weaker working capital management.

Specifically, we split the sample of firms into tertiles based on their level of cash flow management, using the ratio of net working capital to sales in 2007 and run regression equation 4.1 on two sub-samples: the bottom two tertiles, and the upper tertile ⁷. The results are presented in table 9. For both the value of exports and the intensity of exports the coefficient on the double interaction term $PE_i * Post_t$ are only statistically significant for the firms with poorer working capital management. The p-values for the equality of coefficients imply a strongly significant difference between the two sets of firms. This suggests that the effect of PE ownership on firms' exporting during the crisis is considerably stronger on firms which had poorer working capital management in place prior to the onset of the crisis. This aligns with PE investors adding value to their portfolio companies in times of distress (Bernstein et al. (2019)). The results indicate that PE investors are able to help improve the working capital management and cash flow control of their portfolio companies during the crisis, enabling them to continue to being active exporters.

Overall, the results show that private equity-backed companies are associated with improvements in cash flow efficiency and working capital management during the financial crisis. These findings are consistent with PE investors being able to help their portfolio companies in times of crisis (Bernstein et al. (2019)), and in particular, helping to tighten control systems, especially with respect to improving cash flow through better stock and working capital control (Wilson et al. (2012)). The results suggest that PE-backed firms were more efficient operators during the crisis, given evidence that operational efficiency has been found to be the primary mechanism through which improving firms' working capital and cash flow management drives value (Zeidan and Shapir (2017)).

⁷In the robustness section, we split our sample using another measure of working capital management, namely the ratio of working capital to total assets.

8 Conclusion

Given the traditionally high degree of leverage involved in private equity buyouts and the cyclical nature of deal pricing, there has been speculation that private equity investors' portfolio companies may be particularly vulnerable to economic crises. Many believe that the poor structuring of deals and target firm selection in pre-crisis periods, coupled with high leverage in deals, may result in buyout targets being left exposed to the effects of exogenous shocks to the business cycle. However, recent evidence suggests otherwise, as PE-backed targets appeared to have better access to finance during the global financial crisis, and to have defaulted at a lower rate.

In this paper, we build on recent work showing PE ownership to exert a positive effect on target firms' exporting [Lavery et al. \(2021\)](#). Specifically, we study the evolution of PE-backed firms and carefully matched control firms' exporting behaviour around the global financial crisis. The impact of the crisis on international trade is well-documented, with the global average annual growth rate in exporting falling to -12% in 2009. Studying the impact of the crisis on individual firms' exporting in the UK, we find that PE buyout targets' exporting was significantly more resilient during the crisis relative to similar non sponsored firms. Moreover, the hazard of exiting the export market during the crisis was considerably lower for PE-backed firms. Lastly, we provide evidence to suggest that more efficient working capital management and cash flow management may have been a driving force behind this outperformance. The findings are consistent with evidence that PE investors add value to their portfolio companies and improve their operating performance relative to comparable firms, and can help alleviate constraints facing their target companies during economic downturns.

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Figures

Figure 1: Export growth over the crisis

This figure graphs the median one-year growth rate of export value for both private equity-backed firms and control firms around the crisis.



Figure 2: Hazard functions

This figure shows the hazard functions for the treated (private equity-backed) and control samples. The hazard function shows the probability of exit from the export market given that the firm is private equity-backed or not.

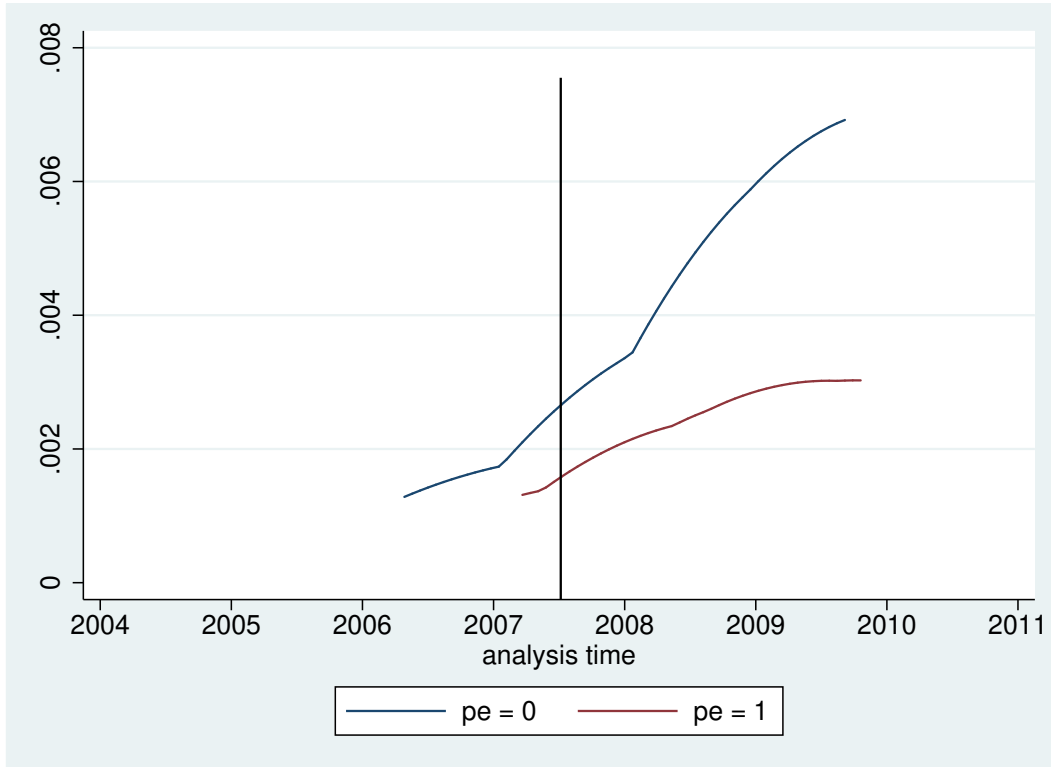
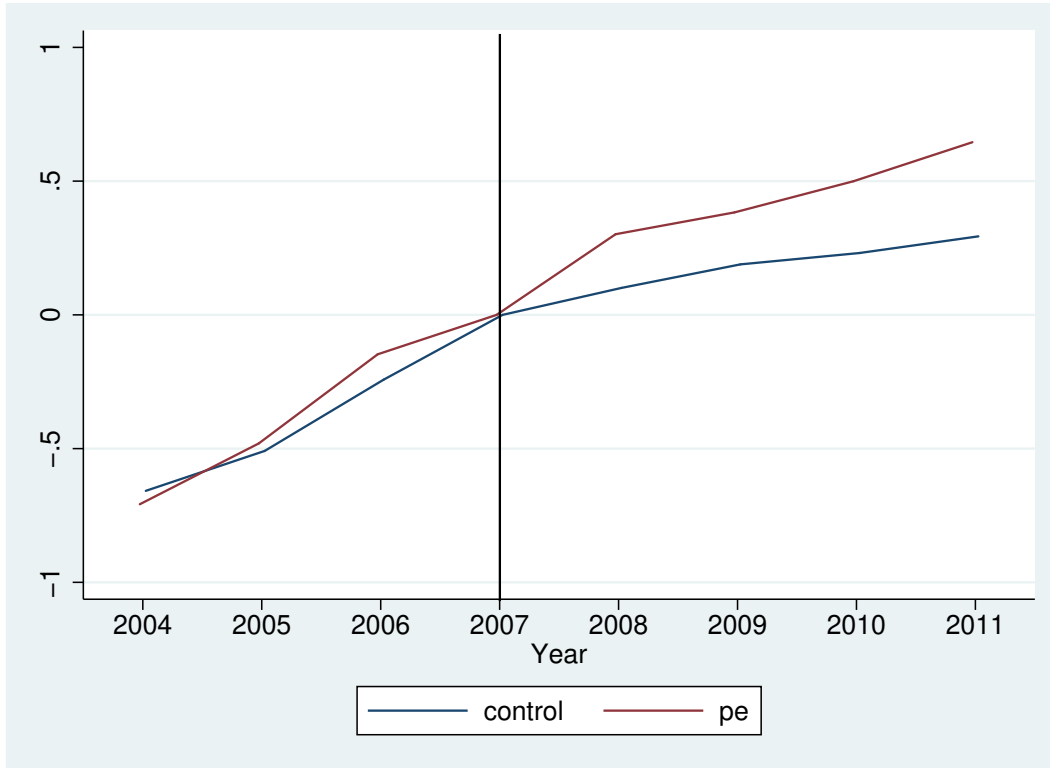


Figure 3: Firms' working capital around the crisis

This figure illustrates the change in firms' net working capital separately for both PE-backed companies and control companies in our sample around the financial crisis. Specifically, the figure reports the α_t of the following equation: $(y_{it}) = \alpha_t + \alpha_i + \varepsilon_{it}$. Where α_t captures year fixed effects and α_i captures company fixed effects. The year precedent to the crisis (2007) is used as the base period and its corresponding coefficient is normalized to zero. The equation is estimated separately for both the PE-backed and control samples, with standard errors being clustered at the company level.



Tables

Table 1: Sample statistics

This table provides sample statistics on the buyout transactions used in our study. Panel A displays the year distribution of the buyout transactions. Panel B describes the type of buyout, while Panel C details the exit status of the deals.

	Number	Percentage
Panel A: Deal Year		
Pre-2000	6	1.0%
2000	13	2.1%
2001	22	3.6%
2002	25	4.1%
2003	35	5.7%
2004	64	10.4%
2005	92	14.9%
2006	155	25.1%
2007	206	33.3%
Panel B: Deal Type		
Divisional buyout	122	20.0%
Private to private	337	54.8%
Public to private	37	6.0%
Secondary buyout	119	19.4%
Panel C: Exits		
Sale	268	43.6%
Secondary buyout	167	27.2%
Write-off	66	10.7%
IPO	20	3.3%
Not yet exited	47	7.7%

Table 2: Pre-crisis descriptive statistics

The below table details summary statistics of sample firms in 2007 across treated (PE-backed companies) and control firms (non-PE-backed companies). *PE-backed* refers to all PE-backed companies; *Control* refers to a sample of control firms, matched on their two-digit SIC code, profitability, size and leverage in the pre-crisis year, 2007. *Log(export)* is the log of the value of export sales. *Cash flow* is defined as a firm's earnings plus depreciation and is scaled by total assets, while *ROA* is net income divided by total assets. *Leverage* is calculated as a firm's ratio of debt to total assets. Other variables are self-explanatory. *** denotes statistical significance at the 1% level; ** denotes the 5% level; * denotes the 10% level.

Variable	PE-backed				Control				t-test
	N	Mean	Median	SD	N	Mean	Median	SD	
<i>Exporting</i>									
Log(export)	142	8.20	8.35	1.64	462	8.52	8.48	1.84	-0.28*
Export/total sales	142	0.30	0.15	0.31	462	0.36	0.23	0.33	-0.06**
1-year export growth	120	0.15	0.11	0.46	360	0.12	0.10	0.52	0.03
2-year export growth	109	0.27	0.18	0.59	342	0.26	0.22	0.71	0.01
<i>Firm Variables</i>									
Total assets (£m)	417	112,349	20,515	317099.4	1,840	84,383	18,283	236159.4	27,965
Sales (£m)	402	84,996	30,212	172682.1	1,489	69,474	24,084	156748.5	15,521
Profitability (ROA)	417	0.14	0.10	0.16	1,840	0.13	0.13	0.14	0.01
Leverage	341	0.63	0.64	0.27	1,309	0.62	0.58	0.64	0.01
Cash flow	402	0.17	0.14	0.16	1,539	0.16	0.13	0.13	0.01

Table 3: Pre-crisis growth rates

The below table details three-year growth rates of firm variables in 2007 across treated (PE-backed companies) and control firms (non-PE-backed companies). *PE-backed* refers to all PE-backed companies; *Control* refers to a sample of control firms, matched on their two-digit SIC code, profitability, size and leverage in the pre-crisis year, 2007. *Log(export)* is the log of the value of export sales. *Cash flow* is defined as a firm's earnings plus depreciation and is scaled by total assets, while *ROA* is net income divided by total assets. *Leverage* is calculated as a firm's ratio of debt to total assets. Other variables are self-explanatory. *** denotes statistical significance at the 1% level; ** denotes the 5% level; * denotes the 10% level.

Variable	PE-backed				Control				t-test
	N	Mean	Median	SD	N	Mean	Median	SD	
<i>Exporting</i>									
Log(export)	104	0.37	0.24	0.73	324	0.33	0.30	0.80	0.04
Export/total sales	103	0.25	0.01	1.33	324	0.44	0.02	1.79	-0.19
<i>Firm Variables</i>									
Total assets	386	0.81	0.51	1.10	1,633	0.79	0.36	1.25	0.02
Sales	335	0.57	0.34	0.74	1,165	0.52	0.28	0.78	0.05
Profitability (ROA)	303	0.90	0.07	2.24	1,257	0.94	0.18	2.23	-0.04
Leverage	284	-0.06	-0.08	0.33	1,019	-0.05	-0.08	0.34	0.01
Cash flow	344	0.29	0.00	1.49	1,167	0.29	0.07	1.44	0.00

Table 4: Exporting & the crisis

This table investigates the effect of private equity buyouts on firms' exporting during the global financial crisis. We estimate all specifications using a difference-in-differences estimator. The dependent variables are the logarithm of export value, and the exporting intensity, which is the ratio of export sales to total sales. PE is a dummy taking the value one for buyout target firms and zero otherwise. Post is a dummy variable which takes the value one for years 2008 to 2011. Columns 2 and 4 include firm-level controls taken in the pre crisis year (2007) and are interacted with the Post dummy. Firm controls include size, leverage, profitability (ROA), and cash flow. Standard errors are clustered at the firm-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Log Exports		Export sales/total sales	
	(1)	(2)	(3)	(4)
PE*Post	0.260*** (0.082)	0.261*** (0.084)	0.022** (0.009)	0.021** (0.010)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	4,714	4,714	4,714	4,714

Table 5: Evolution of exports over time around the crisis

This table reports the estimates from a time-varying fixed effects model. Specifically, the table reports β_k of Equation 2. The dependent variables are the logarithm of export value, and the exporting intensity, which is the ratio of export sales to total sales. PE is a dummy taking the value one for buyout target firms and zero otherwise. Columns 2 and 4 include firm-level controls taken in the pre crisis year (2007) and are interacted with the Post dummy. Firm controls include size, leverage, profitability (ROA), and cash flow. Standard errors are clustered at the firm level. *** denotes significance at the 1% level, ** at the 5%, and * at the 10%

	Log Exports		Export sales/total sales	
	(1)	(2)	(3)	(4)
PE*2004	-0.040 (0.104)	-0.042 (0.104)	-0.002 (0.012)	-0.002 (0.012)
PE*2005	-0.014 (0.093)	-0.017 (0.093)	-0.001 (0.009)	0.001 (0.010)
PE*2006	-0.065 (0.073)	-0.067 (0.072)	-0.007 (0.009)	-0.006 (0.009)
PE*2008	0.036 (0.061)	0.038 (0.062)	0.009 (0.007)	0.008 (0.007)
PE*2009	0.261*** (0.073)	0.259*** (0.074)	0.018** (0.088)	0.017** (0.009)
PE*2010	0.308*** (0.089)	0.308*** (0.091)	0.025** (0.010)	0.024** (0.011)
PE*2011	0.321*** (0.100)	0.319*** (0.101)	0.032** (0.013)	0.030** (0.013)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	4,742	4,742	4,742	4,742

Table 6: Cox proportional hazard model

This table reports the estimated coefficients of a Cox proportional hazard model for private equity-backed firms and control firms. PE is a dummy variable taking the value one for PE-backed firms, and zero for control firms. Other control variables include *size* which is the log of total assets, *age* and *leverage*, which the ratio of total debt-to-total assets. *Productivity* is the firm's sales per employee. *ROA* is net income divided by total assets. Lastly, *cash flow* is earnings plus depreciation, scaled by total assets. All control variables are measured in the pre-crisis year, 2007. Standard errors are reported under the coefficients in parenthesis and *, **, *** indicate levels that are significantly different from zero at the 10%, 5% and 1%, respectively.

	(1)	(2)
PE	-0.970*** (0.313)	-0.943*** (0.314)
Size		-0.107** (0.053)
Age		-0.036* (0.014)
Productivity		-0.096** (0.047)
Leverage		-0.105 (0.227)
ROA		0.858 (0.719)
Cash Flow		-0.860 (0.822)
Firm controls	No	Yes
Observations	18,056	18,056
LR Chi ²	12.69***	21.32***

Table 7: Private equity ownership and export market exit during the crisis

The below estimates are from a complimentary log-log (cloglog) model and a probit estimation. The dependent variable is a dummy equal to 1 if a firm exits the export market in year t , and 0 otherwise. PE is a dummy variable taking the value one for PE-backed firms, and zero for control firms. Other control variables include *size* which is the log of total assets, *age* and *leverage*, which the ratio of total debt-to-total assets. *Productivity* is the firm's sales per employee. *ROA* is net income divided by total assets. Lastly, *cash flow* is earnings plus depreciation, scaled by total assets. All control variables are measured in the pre-crisis year, 2007. Standard errors are reported under the coefficients in parenthesis and *, **, *** indicate levels that are significantly different from zero at the 10%, 5% and 1%, respectively.

	cloglog		Probit	
	(1)	(2)	(3)	(4)
PE	-0.721** (0.307)	-0.718** (0.312)	-0.292*** (0.112)	-0.271** (0.114)
Size		-0.110** (0.051)		-0.040* (0.022)
Age		-0.035 (0.152)		-0.012 (0.059)
Productivity		-0.096** (0.044)		-0.038** (0.016)
Leverage		-0.123 (0.209)		-0.050 (0.079)
ROA		0.865 (0.517)		0.400 (0.231)
Cash Flow		-0.926 (0.662)		-0.412 (0.276)
Firm FE			Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Observations	15,799	15,799	15,799	15,799

Table 8: Cash flow and working capital management

This table investigates the effect of private equity buyouts on firms' working capital and cash flow management during the global financial crisis. We estimate all specifications using a difference-in-differences estimator. The dependent variables are the logarithm of the CCC number of days, the logarithm of net working capital, and the ratio of net working capital to firm sales. PE is a dummy taking the value one for buyout target firms and zero otherwise. Post is a dummy variable which takes the value one for years 2008 to 2011. Columns 2, 4, and 6 include firm-level controls taken in the pre crisis year (2007) and are interacted with the Post dummy. Firm controls include size, leverage, profitability (ROA), and cash flow. Standard errors are clustered at the firm-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	CCC		NWC		NWC/Sales	
	(1)	(2)	(3)	(4)	(5)	(6)
PE*Post	-0.120**	-0.121**	0.226***	0.177***	0.019*	0.016*
	(0.050)	(0.051)	(0.063)	(0.065)	(0.011)	(0.011)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Observations	7,032	7,032	13,608	13,608	14,247	14,247

Table 9: Splitting firms based on pre-crisis cash flow management

This table investigates the effect of private equity buyouts on firms' exporting during the crisis for subsamples of firms which had strong and weak cash flow management prior to the crisis, using the ratio of working capital to sales as a firm-level measure of working capital management. Panel A contains firms in the top tertile (strong cash flow management), while panel B contains firms in the bottom two tertiles (poor cash flow management). The dependent variables are the logarithm of export value, and the exporting intensity, which is the ratio of export sales to total sales. PE is a dummy taking the value one for buyout target firms and zero otherwise. Post is a dummy variable which takes the value one for years 2008 to 2011. Columns 2 and 4 include firm-level controls taken in the pre crisis year (2007) and are interacted with the Post dummy. Firm controls include size, leverage, profitability (ROA), and cash flow. Standard errors are clustered at the firm-level. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Log Exports		Export sales/total sales	
	(1)	(2)	(3)	(4)
Panel A: Strong cash flow management				
PE*Post	0.130 (0.096)	0.128 (0.099)	0.008 (0.011)	0.008 (0.012)
Observations	1,670	1,670	1,670	1,670
Panel B: Weak cash flow management				
PE*Post	0.327*** (0.114)	0.322*** (0.115)	0.031** (0.013)	0.030** (0.014)
Observations	3,044	3,044	3,044	3,044
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes
Test of equality (P-value) for PE*Post	0.000	0.000	0.000	0.000